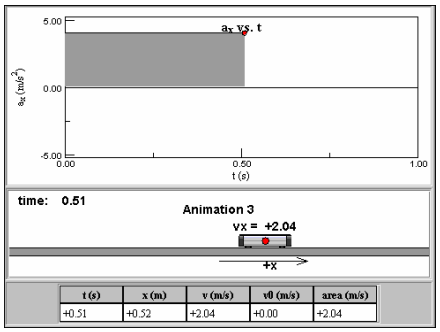
Worksheet for Exploration 2.8: Determine the Area Under a(t) and v(t)



A 1.0-kg cart on a track experiences several different constant accelerations as shown in the animation **(position is given in meters and time is given in seconds)**. The red dot shows you where position measurements are taken. In addition, the graph of either the acceleration vs. time or the velocity vs. time is shown (use the check box to toggle between the two) along with data in a table. One cell of the table shows the calculation of the area under the curve (the integral $\int a\,dt$ or $\int v\,dt$) as it is plotted in the graph shown. Restart.

View all five animations and answer the questions below for the acceleration vs. time graph.

a. What is the initial velocity in each animation?

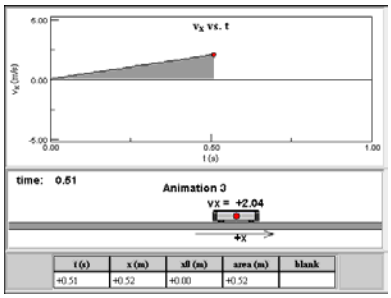
b. What is the final velocity in each animation?

c. What is the difference between the final velocity and the initial velocity ($v-v_0$) in each animation?

d. What is the total area under the curve calculated during each animation?

e. How are your answers for (c) and (d) related? Does this make sense? Why?

View all five animations and answer the questions below for the velocity vs. time graph (use the check box to view the velocity vs. time graphs).



f. What is the initial position in each animation?

g. What is the final position in each animation?

h. What is the displacement of the cart ($x-x_0$) in each animation?

i. What is the total area under the curve calculated during each animation?

j. How are your answers for (f) and (g) related? Does this make sense? Why?